

13047
49

UNIVERSITY OF
THE MEASUREMENT OF SUGGESTIBILITY
IN SCHOOL CHILDREN.

A thesis submitted to the faculty of the Graduate School of the University of Minnesota, by Austin S. Edwards, in partial fulfillment of the requirements for the degree of Master of Science.

May 21, 1910.

9
8
MOM
EdS

OUTLINE OF THESIS.

THE MEASUREMENT OF SUGGESTIBILITY IN SCHOOL CHILDREN.

AUG 12 1910 5.70

1. Aim of research
2. Review of the investigations of suggestion.
 - a) ~~Methods used in former investigations.~~
 - b) ~~Results and conclusions~~
3. Aim of this study
4. Methods and apparatus
 - a) Directions given to subjects
 - b) Criticisms of the methods used.
5. Experiments chosen to be worked up for this paper.
6. Results
7. Conclusions
8. Bibliography.

AIM OF THIS STUDY

The aim of this study is to make a preliminary survey of the field of normal suggestibility, and to discover, if possible, satisfactory tests for the measurement of direct and indirect suggestibility, so that their relationship with each other and with other motor and mental traits may be determined. The suggestion tests used were in the fields of sensation, perception and memory. The sensation and perception tests were for odors and lines and figures. In one of the perception tests the imitation was of the experimenter, in the other the factor of imitation of the crowd was introduced. The memory test was an attempt to discover the effect of questions which differ in the degree of suggestion given.

In studying the relationship of suggestibility two correlations have been calculated.

Tests for measuring motor and intellectual ability were also given for the purpose of studying the relation-

ships of the traits with suggestibility. One of the correlations made is between direct suggestion and scholarship. Scholarship was estimated according to lists made out by the teachers. The tests were given in the Garfield School in Minneapolis. They were given in a series to each class, and always between 11 and 12 A. M. It took from 45 to 55 minutes to give the series of tests to the class.

The use of these tests does not mean that they were considered the best that could be found. Two things in particular had to be kept in mind, namely, that the tests must be group tests, and that they must be of such character as could be given to children of quite different ages. The question of time had also to be considered. The Binet line tests seem to be as satisfactory as any. They admit of wide distribution and do not call out a critical attitude of mind. The suggestion questions after Binet and Lippman seem to be good. Perhaps

other tests, such as those of Small and Bell, are equally good, but they did not seem to fit quite as well the demands of time, age and number of subjects that were experimented on at one time.

REVIEW OF THE INVESTIGATIONS OF SUGGESTION.

Comparatively little work has been done in the fields of suggestion. The experiments of Binet (4), in France, and of Sidis (27) at Harvard, are the most extensive and the most important. The former in his "La Suggestibilité" sums up the results of various tests given for sensory, perceptual, and memory suggestion, on school children and adults. These tests were for both direct and indirect suggestion.

Most important among these were the line, weight, and memory tests. In one experiment a line 40 mm. was shown and the subject asked to choose the same length line from many on the table. The questions were then asked: "Are you very sure?" "Should it not be a line to one side?" In another test a line 50 mm. was shown and the subject asked to reproduce it. Then a second line 40 mm. was shown and the director stated that the second line was longer than the first. A third line

which was the original 50 mm. line, was then shown, the subject being told that this line was a little shorter than the second. Other series of lines are used in which the suggestion is given by the lines themselves. This suggestion lines in the increase of the first few lines shown, the rest being of the same length, e. g., the first five increase and the following 55 were the same length as the fifth. Similar experiments with points and with weights are given. In suggestions for memory many objects and pictures were used and questions as to the presence and certain features of things absent were asked. Binet reaches the conclusion that suggestion is in direct agreement with the development of intelligence and the strength of the imagination of the subject. Suggestion is synonymous with educability.

Dr. Sidis presents in his book, "The Psychology of Suggestion," the most extensive ^{on this subject} work in the English language. The book is divided into three parts; the first is entitled "Suggestibility," the second "The Self," and the third "Society." By far the larger part of the book is taken up with abnormal suggestibility. For the purpose of proving the reality of normal suggestibility, a successive series of letters or of figures was introduced through a slit on a white screen, the time being carefully measured, and at the end of the exposure the subjects were asked to write down immediately on paper which they kept ready in their hands, anything that came into their minds at that particular moment - - letters, numerals, words, phrases, etc. The series of letters and figures were arranged according to the following factors and their combinations: repetition, frequency, coexistence, and last impression. The results for repetition showed that in 300 cases only 17.6% succeeded;

for frequency 42.6%; coexistence and repetition together 16.6%; last impression 63.3%; coexistence and last impression 18.3% frequency and last impression 75.2%. Thus it would seem that in normal suggestibility for adults, frequency and last impression were most powerful, either alone or together.

For the suggestion of movements, several objects were placed on a table, the whole being covered with a screen. The subject was to keep his mind a blank as much as is was in his power. When the screen was removed, the experimenter would loudly suggest some action-- such as "read", "write", "strike", etc. On the table were the objects appropriate to the actions. In 500 cases ~~50%~~ 50% succeeded. A third set of experiments was carried out with colored squares. The squares were placed on a white background and were hidden from the subject by a screen. When the screen was removed the subject was to choose one of the squares whichever he

liked. The choice of the following six factors were studied: abnormal position, colored cover, strange shape, color verbally suggested, place verbally suggested, and environment as modified by changing the background.

Sidis distinguishes here between immediate and mediate suggestion. In the former the square with the suggestive feature is selected; in the latter, the square next to it is chosen. The results shows that for immediate suggestion, abnormal position is the most effective, 47.8% of the cases being successful; while in mediate suggestion, environment is the most powerful, although only 22.2% of the trials succeed. Sidis therefore concludes that for immediate suggestion a familiar thing in a strange, abnormal position or shape produces the most effective suggestion, while for mediate suggestion, environment is the most powerful.

Conditions of normal suggestion are summed up under seven heads: fixation of attention, distraction, monotony, limit

monotony, limitation of voluntary movements, limitation of the field of consciousness, inhibition and immediate execution. The law of direct suggestion Sidis formulates as follows; "Normal suggestibility varies as indirect suggestion, and inversely as direct suggestion." The general law of suggestibility, Sidis later formulates with the added data from his study of abnormal suggestion, and is as follows: "Suggestibility varies as the amount of disaggregation, and inversely as the unification of consciousness."

M. H. Small made a number of experiments on school children to discover how far illusions of sense could be suggested. Direct suggestion of sugar, quinine and salt were given. The stimulus was distilled water. For illusions of sight a toy camel and windlass were used. A thread stretched from the camel to the windlass but did not move the camel when the windlass was turned. For illusions of touch the children

were told that a raveling was to lower and take the hand, the eyes were bandaged, a description of how it might feel was given to them. With eyes bandaged, the illusion of heat waves was suggested by the crackling of a burning match. The results given for the tests to groups were as follows: With a spray of distilled water and talk about perfumes and flowers, 392 smelled an odor, while 148 did not smell any odor; the suggestion succeeded in 75% of the cases. In the suggested illusions of sugar and quinine, 277 out of 325 or 85% accepted the suggestion; 95% suggested the illusion of salt, and 90% the suggestion of quinine. Out of 291 cases 381, or 76.3%, accepted the suggested illusions of the moving camel. In individual tests of the same nature, 5 out of 21 thought they felt hot plainly; 18 out of 21 got the suggestion of touch; 17 out of 19 had the illusion of heat waves.

J. E. Brand used printed signs with words "short" and "long" in tests on the reproduction of horizontal lines. Of four observers, three were influenced positively, and one acted directly opposite to the suggestion. In all cases the "long" suggestion was more effective than the "short."

W. G. Smith and S. C. M. Sowton have investigated the effect of what they called successive contrast.

Lines varying from 2 to 20 cm. were shown and immediately afterward a standard line of 10 cm. The standard in all cases was underestimated. The shorter lines gave positive suggestion, and the longer ones gave negative suggestion. Smith and Sowton have also studied the effect of suggestion on rhythm and in the field of esthetics.

J. C. Bell used auditory and visual suggestion in tests of the reproduction of triangles and of point distances. The suggestion consisted of commands,

"make high" "make low", etc., and a diamond shaped figure. The results show that in the reproduction, without suggestion, the aggregate error for all point distances, and all triangles, with two exceptions, was positive; there were decided individual differences in susceptibility to suggestion; the suggestions were not effective in the first set of experiments (triangles with auditory suggestion) less so in the later ones; low suggestion was more effective for the positive type, less effective for the negative type, than high suggestion.

Munsterberg (18) gives the following to make a quick discrimination between suggestible and the unsuggestible pupils in a schoolroom: Show two circles of equal size and write inside one a small figure, perhaps 24, and inside the other a large one, 98.

Otto Lippman (15) has worked out a plan of three forms of questions; those with no suggestion, those with moderate, and those with strong suggestion; also

a formula for determining the frequency of the suggestions realized, the frequency of resistance to the suggestions, and for the efficacy of the suggestions.

Slosson (28) reports an experiment in which he noted how many in a large audience he could make think they smelled a suggested odor. He used distilled water on cotton, holding his head away and starting a stop watch. The audience were told that they probably never smelled this chemical mixture before, and he said he hoped it would not be too disagreeable. In 15 seconds most of the people in the front row had their hands up as signifying their ability to smell the odor; in 40 seconds the odor had traveled to the back of the room with a quite regular wave front. Three-fourths of the audience claimed to smell the odor. At the end of one minute some on the front seats appeared to be unpleasantly affected. Slosson also produced hallucinations of temperature and pain with magnets. The magnets do not have to be magnetized, but to just look real. As some complain of pain in the hand worked upon, Slosson says that the

experiments should be afterward explained to the subjects.

Pearce tested the effect of suggestion on attention.

Ross (23) concludes that suggestibility varies according to, species, race, age, temperament, sex, mental condition, source of the suggestion, duration of the suggestion, and volume of the suggestion.

Baldwin (1 dict) gives twelve phases of suggestion, which apart from hypnosis, illustrate them all.

They are:- sensori-motor, ideomotor, motor, sensory, ideal, personality, contrary, negative, organic, hysterical, social, and imitative.

METHODS AND APPARATUS.

The tests for suggestion may be divided into two kinds, namely, those for direct and those for indirect suggestion. As to mental processes involved, they are divisible into tests for sensation, perception and memory. For intellectual ability, I have used tests for controlled association of ideas, quickness of perception, imagination, memory and judgment. Three tests were given for motor ability, one for accuracy, and two for quickness. The choice of these tests, as has been said, does not mean that they were considered the best that could be found, but that they seemed to be as good as any to fulfill two requirements in particular, namely, that they must be used as group tests, and secondly, that they must be used for groups of people of very different ages.

The test for direct suggestion was the modifi-

cation of the Binet line test, and consisted of strips of cardboard, 10 cm. by 46 cm., on which were heavy lines. The lines were midway between top and bottom of each strip, each line started 9.5 cm. from one end of the strip and the lines on each of the three strips were of the same length, 14 cm. Directions were as follows: "I am going to show you three lines, and I want you to draw lines like them. Begin at the red line and draw to the right. This is the first line. Draw. The second line is a little longer than the first. This is the second line. Draw. This next line is a little shorter than the last one. Draw." This test as well as the one described immediately following was especially good in allowing a wide distribution of cases.

One of the indirect line tests used by Binet was modified and used as one of the four indirect suggestion tests in this study. Cardboard strips were used the same as those mentioned in the last test.

The suggestion, however, lay in the length of the lines themselves. The first six lines were of the following length respectively: 2.5 cm., 4 cm., 5.5 cm., 7 cm., 8.5 cm., 10 cm., the remaining 12 lines being each 10 cm. in length, thus making a series of 18 lines. But 18 lines are altogether too few. Many subjects draw 18 lines with each increasing over the preceding. ~~But the~~

~~use of only 18 lines.~~ The trouble sought to be avoided by the use of only 18 lines was that too large a sheet of paper is required for more, and with only 18 lines, many will draw some of the lines the full length possible with the size paper used. 19.9 cm. is the longest possible line. The directions were as follows:

"Here I want you to draw lines like the ones I show you. Begin at the red line and draw to the right. Please do not look at anyone else's paper." Suggestibility is shown by the number of lines above the sixth that continue to increase and by the number of millimeters

of increase of the lines between the sixth and the longest. The papers of not a few show that the ends of the lines form an irregular curve, and though useful interpretations may be made for rough work, it is evident that a true interpretation of the results is a research problem in itself.

A similar test was given, 43 lines being shown. The pupils were here asked to give their answers differently. These directions were given: "I would like you to look at the lines I show you, and decide how long they are in inches. Please put down on your papers the number of inches you decide. Do not use feet, but put everything down in inches." This, as results show, attract the attention too much to a careful judgment of the length of the line to get as full effect of the suggestion.

The indirect test for memory suggestion was given immediately after one of the memory tests. The

memory test consisted of showing 12 objects and asking the subjects to write on their papers as many of them as they could remember. The following suggestion test came as soon as the memory test was completed, only a few seconds elapsing between the two. The directions follow: "Will you please answer the following questions: 1. Was there an eraser on the pencil? 2. What was attached to the end of the watch chain? 3. Which colored thread was in the button, black or white? 4. Was there a stamp on the letter? 5. What was on the front cover of the book? 6. Which blade of the knife was open, the small or the large one? 7. Was there a knot in the string? 8. What was on the spoon? 9. Which kind of glasses did the man in the picture wear, the kind with bows that go over the ears, or just the nose glasses? In none of the cases was the thing suggested present, that is to say, there was no eraser on the pencil, nothing attached to the end of the watch-chain, no thread in the button, etc. The object of this test was to measure

the effectiveness of question of different degrees of suggestibility. The division is threefold, namely: The questions of slight, moderate and strong suggestibility. The first, fourth, and seventh give slight suggestion; questions 2, 5 and 8 moderate, and the 3, 6 and 9th strong suggestion. The difference of suggestibility of these three groups is plainly marked and also the difference in the degree of suggestibility within each group is quite marked, so that the test might well be worked out to detect considerably more than three degrees of suggestibility. This test is worked out after Binet.

The suggested odor was given in a way somewhat different than any that had been reported. Two atomizers were used; these were filled with distilled water which had been colored with an odorless coloring material. The fluid in the first used atomizer was colored a deep blue, the second a red. The directions follow: "I

have here a mixture which I want to see if you can smell as I squirt it out into the room. If you smell it put 'yes' on the paper, and if you cannot smell it, put down 'no'. Please do not look on anyone else's paper. " Time was taken to squirt the liquid into all parts of the room, care being taken to pass up at least every other aisle. One minute and a half was given for each of the odor tests. After asking the subjects to write 'yes' or 'no' on their papers, the second atomizer which contained the red fluid was used. The directions were as follows: "I have here another mixture which I am going to squirt out into the room, and as soon as you smell it, I want you to raise your hands." At the end of the time given above, the following direction was given: "If you raised your hand, please put 'yes' on your paper, and if you could not smell it at all, put 'no' on your paper." The results are interesting as they show on the average about twice as many giving an

affirmative answer when the factor of imitation entered. The test is of less value for individual measurement as there is no possibility of distribution of cases. It is valuable for comparing results in different grades. The chief value lies perhaps in showing how imitation, one of the results of suggestion, becomes itself a powerful suggestive factor. There seems to be a possibility of some chance in the latter test which depends on imitation of the less suggestible on those who first raised their hands, for if it happened that only a few raised their hands at first, the imitation might well be of those who kept their hands down.

The influence of the size of numbers on concomitant phenomena as suggested by Munsterberg was carried out in the following way: two cards with circles exactly the same size containing each a number, were shown simultaneously. These directions were given: "I have here two circles, and I want you to decide as to

whether they are the same size, or whether one is larger than the other. There is a number in each circle. If you think both circles are the same size, write simply the word 'same'. If you think one is larger than the other, write which one you think is larger." Rather unfortunately the numbers chosen did not have the same number of digits. The numbers were 98 and 5. The latter left more space between the number and the circumference of the circle than was left in the circle with the 98.

This introduces a space illusion. Negative results were obtained, however, only in the 8th grade, where more said that the circle containing the figure 5 was the larger, and comparatively few said that the circle containing 98 was the larger. The illusion must have affected the result all through the grade, although a number of two digits should have been used instead of the 5. The results obtained are, however, not without value. The effect of the single digit in the smaller number could only

have antagonized the effectiveness of the desired suggestion, so that the results obtained have at least not been heightened by this extra factor.

Not the least interesting was the experiment of using an inverted caret in numbering all of the tests. The number of each test was put on the board as each came in turn, and under each number an inverted caret. With very few exceptions, all the school children used the character in numbering their tests, and of the few adults on whom the tests were given, not one used them.

THE TEST FOR MOTOR AND INTELLECTUAL ABILITY.

The giving of the tests for motor and intellectual ability may be summed up briefly. Those for controlled association of ideas, quickness of perception, imagination and judgment, and the motor test for accuracy and quickness are the same as those used by Dr. Horsworthy at Columbia University, although they were given somewhat differently. Instead of allowing the subject to finish each test, as was originally done, and then use the time required to complete the work as a basis of measurement, the results of these tests are worked out in turn of the amount of work done in the limited time given. The following directions were given for the easy opposite test which was used for controlled association of ideas: "On these papers you will find a column of words. When I tell you to start, I want you to write beside each word, a word of the opposite meaning. For instance, what is the opposite of high? What is the opposite of the word 'cold'?"

B.

Write as fast you can beside each of the words in the column a word that means the opposite thing from it. For example—if a thing was not "long," what would it be?

good
outside
quick
tall
big
loud
white
light
happy
false
like
rich
sick
glad
thin
empty
war
many
above
friend

Test for controlled association of ideas.

The subject is to write a word of opposite meaning beside as many of these words as is possible in the time given.

Time limit, 30 seconds.

Put a mark in the margin opposite each of the following sentences which is absurd:

Though armed only with his little dagger, he brought down his assailant with a single shot.

Silently the assembly listened to the orator addressing them.

While walking backwards he struck his forehead against a wall and was knocked insensible.

Did you see his boat cleaving the water like a swan?

Having reached the goal, I looked back and saw my opponents still running in the distance.

Offended by his obstinate silence she refused to listen to him further.

The one-armed cripple was attacked by a dog which seized his wrist, but he pushed it off with the other hand.

With his sword he pierced his adversary, who fell dead.

While threading my way through the crowd, I came suddenly upon an old friend.

The storm which began yesterday morning has continued without intermission for three days.

The dogs pursued the stag through flower gardens in full bloom.

That day we came in sight of several ice-bergs which had been entirely melted by the warmth of the Gulf Stream.

While sharpening his three-bladed knife, my cousin cut his middle finger.

Our horse grew so tired that finally we were compelled to walk up all the hills.

The red-haired girl standing in the corner is taller than any of her older brothers.

The bear, approaching me stealthily from behind, had almost escaped from my pursuit.

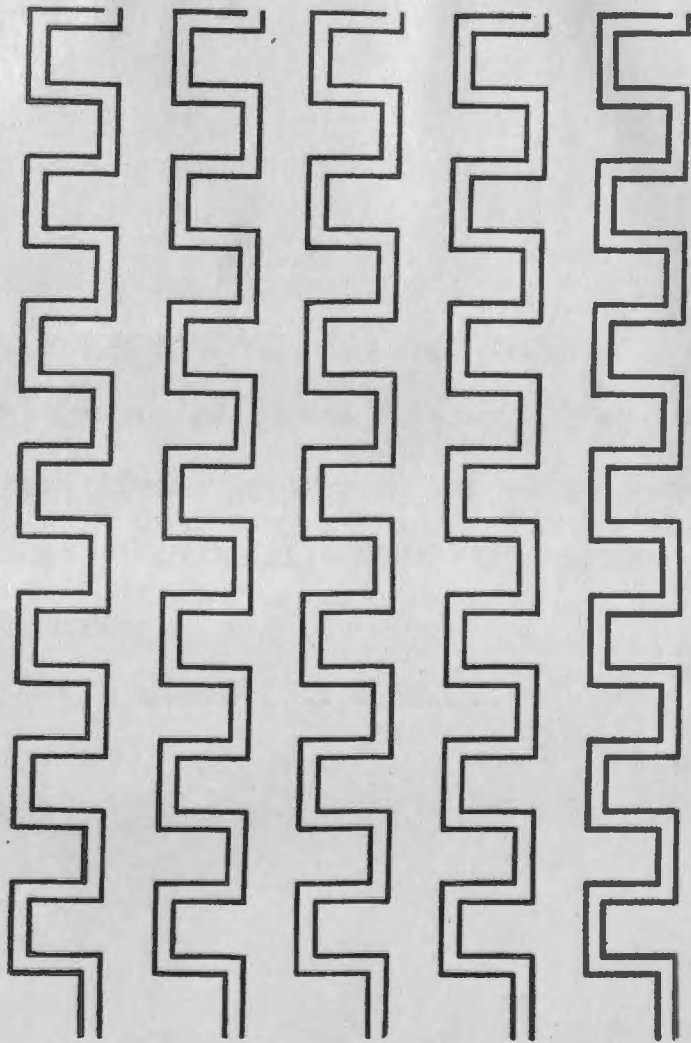
A bricklayer fell from a new building quite near our house, and broke both his legs.

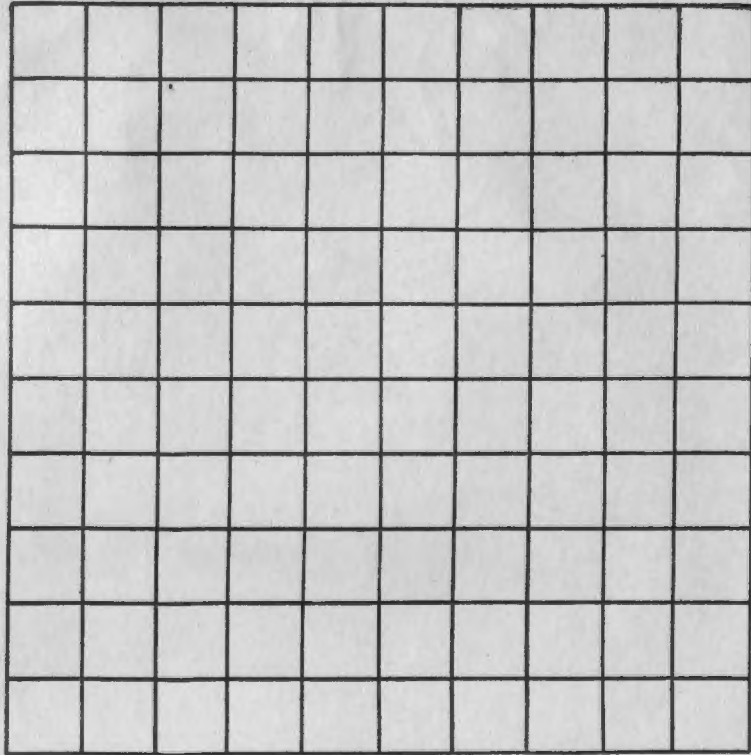
The hands of the clock were set back, so that the meeting might surely close before sunset.

Many a sailor has returned from a long voyage to find his home deserted and his wife a widow.

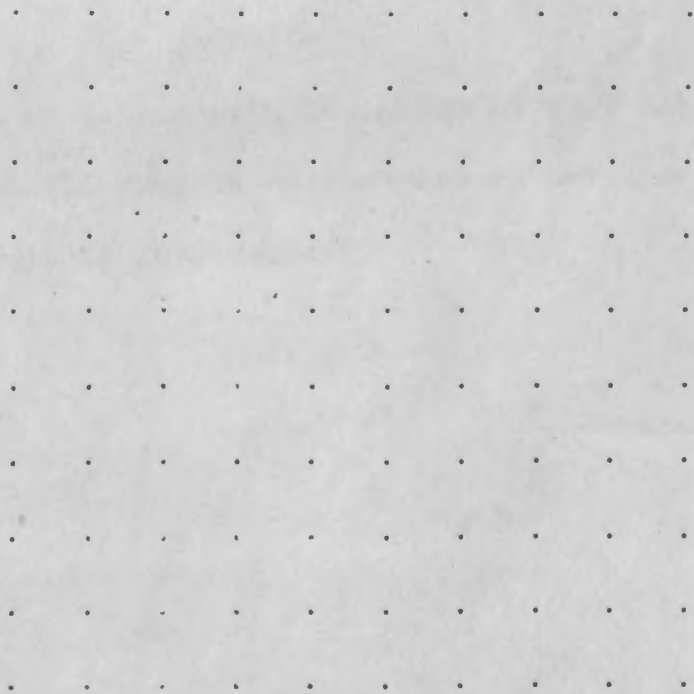
The two towns were separated only by a narrow stream which was frozen over all winter.

tween
and to
of the





insid
given



OYKFIUDBHTAGDAACDIXAMRPAGQ ZTAACVAOWLYX
WABBTHJJANEEFAAMEAACBSVSKALLPHANRNP KAZF
YRQ AQ EAXJUDFOIMWZSAUCGVAOABMAYDYAAZJDAL
JACINEVBGAOFHARPVEJCTQ ZAPJLEIQ WNAHRBUAS
SNZMWAAAWHACAXHXQ AXTDPUTYGSKGRKVLGKIM
FUOFAAKYFGTMBLYZIJAAVAUAACXDTVDACJSIUFMO
TXWAMQ EAKHAOPXZWC AIRBRZNSOQ AQ LMDGUSGB
AKNAAPLPAAAHYOAEKLN VFARJAEHNPWIBAYAQRK
UPDSHAAQ GGHTAMZAQ GMTPNURQ NXIJEOWYCREJD
UOLJCCA KSZAUAFERFAWAFZAWXBAAAVHAMBATAD
KVSTVNAPLILAOXYSJUOVYIVPAAPSDNLKRQ AAOJLE
GAAQ YEMPAZNTIBXGAIMRUSAWZAZWXAMXBDXAJZ
ECNABAHGDVSVFTCLAYKUKCWA FRWHTQ YAFAAA OH

may "A

Name _____

Time in seconds _____

Do as many as you can in the time I give you." (Time limit 30") For quickness of perception, the A test was given with these directions: "When I tell you to start, I want you to mark out as many 'A's' as you can in the time I give you. You are to start when I say 'start' and stop when I say 'stop'. Begin at the beginning of the line each time and work toward the right." (Time limit 45") The test for judgment, the absurd sentences, was accompanied with these directions: "Some of the sentences on the paper you have are sensible and some are absurd. What does absurd mean? Those that you think are absurd, that is, foolish, I want you to mark with a cross. Put a cross in front of the ones you think are absurd. (Time limit 1:30")

The motor test for quickness was tapping in squares, and drawing of curved lines. The directions for the former were in these words: "On these papers I want you to hit inside each of the squares with a pencil.

You are to do as many as you can in the time I give you. Wait until I say 'start' and be sure to work from left to right. (Time limit 20") For drawing curved lines the subjects were told: "In this experiment you are to draw as fast as you can, and I want you to draw a line between as many of these lines as you can. You are to do it without touching the wavy lines." (Time limit 1' 15")

To test the imagination, a picture was selected in which there appeared three people. A lady was seated on a sofa. A man rather under middle age knelt before her with his face buried in her lap. Behind them stood a man somewhat past middle age. The directions were as follows: "I want you to look at this picture and see what you think has happened to make the people act this way. I want you to write as many reasons as you can think of in 5 minutes, to explain what you think has happened to make the people act as they do." (Time limit 5")

For memory both numbers and objects were shown. Directions for numbers: "I am going to show you some numbers and I want you to write as many of them as you can in the order they appear. Try to get them in the right order as nearly as you can." For objects: "I am going to show you some objects, and I want you to write as many as you can remember on your papers. Try to write them in the order I show them, as nearly as you can." (Time limit after children begin to write 1'). The objects shown were, picture, pencil, watch-chain, knife, book, ribbon, spoon, button, cork, dollar, pocket mirror, envelope.

Besides the above mentioned tests for intellectual ability, lists of the children were made out by the teachers, in which they listed the pupils in the order of their rank as regards scholarship. The teachers were asked simply to make out the list on the basis of scholarship, it being deemed advisable to leave the interpretation of the term "scholarship" of the individual teachers.

EXPERIMENTS CHOSEN TO BE WORKED UP FOR THIS PAPER

with

RESULTS AND CONCLUSIONS.

The experiments which have been worked up specially for this research may be outlined in general as follows:

1. For direct suggestion, ~~The~~ line test.
2. For indirect suggestion, ~~the~~ line test, suggestive questions with three degrees of suggestibility, sensory suggestion test for odors, given also with the added effect of imitation, test to show suggestiveness of large numbers, effect of using odd symbols.

The following correlations have been made: First between direct and indirect suggestion as shown by the line test; secondly, between suggestibility and scholarship as shown by the three line test and the teacher's estimate of scholarship.

RESULTS

DIRECT SUGGESTION

(Three line test)

Taking first the three line test for direct suggestion, it was found that in 361 cases the suggestion caused a difference on the average of 18 mm. with a m.v. of 8.72. The difference between the 4th and 5th grades, and the 7th and 8th grades, corroborates the general law, i. e., that suggestibility decreased with increasing age. In the two lower grades mentioned, the average results showed a modification of 22.5 mm. with a m. v. of 6.49, while the two upper grades gave the average of 13 mm. and a m.v. of 10.76. In the lower grades the smallest increase was that of 5mm., and the largest 66 mm. On the other hand, 22 out of the 144 pupils in the 7th and 8th grades did not increase the lines at all, the extremes ^{for these grades} being 0 and 65 mm. Out of the 183 cases in the 4th and 5th grades, only 4 pupils acted contrary to the suggestion. In the 7th and 8th grades 19 out of

144 cases acted contrary to the suggestion in either one or both instances. See chart #1. This test, as has been said, seems a good one, as it allows a wide distribution of cases and is not invalidated by the limitation set by the size of the paper used as was the case in the eighteen line test. For measurement it seems to be good, but would not be likely to discover extreme cases quite as well as would the indirect line test if used with a large number of lines.

DIRECT SUGGESTION

(Three-line test)

Grades	average increase in mm.	m.v.	Smallest increase in mm.	Largest increase in mm.
4 th + 5 th	22.5	6.49	5	68
7 th + 8 th	18.	8.72	0	55

Grades	Pupils drawing all three lines the same length	Cases	% of pupils drawing all three lines equal
4 th + 5 th	0	153	0%
7 th + 8 th	22	144	15.35%

Grades	Pupils acting contrary to the suggestion	Cases	% of children acting contrary to the suggestion
4 th + 5 th	4	153	2.4
7 th + 8 th	19	144	13.2

DIRECT SUGGESTION (Three-line Test.)

Comparison of the 4th and 5th grades with the 7th and 8th. A total of 299 cases.

Chart #1

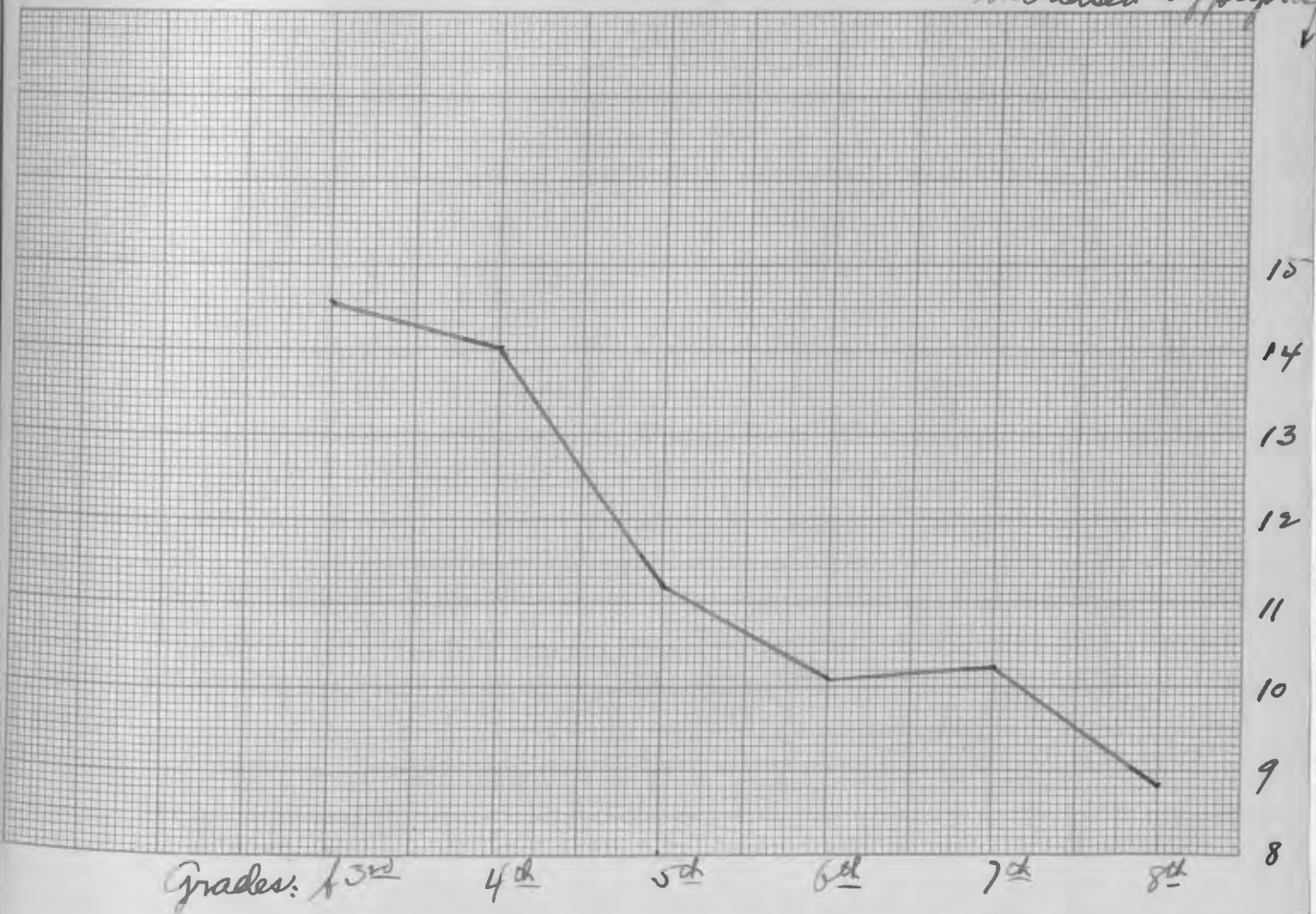
TESTS FOR INDIRECT SUGGESTION

Eighteen-line Test.

In the eighteen-line test for indirect suggestion, it was found ~~that in 421 cases~~ in the A-3rd through the A-8th grades, ^{with a total of 421 cases} that the average number of lines which continue to increase in length was 10.2mm. Since the first six lines only of those shown to the subjects increased, the lines that were increased on account of suggestion were on the average 54 mm. with a m.v. of 4.2. Chart #2 gives the results more in detail. The fact that the results in the lower grades ~~less~~ shows a skewed curve, ^{toward the extreme length} many increasing the entire eighteen lines, and there being no chance for a gradual dropping off, emphasizes the fact that the test as given was not adequate to measure the extreme suggestibility that was thereby indicated.

Forty-three Line Test.

Number of lines increased by pupils



INDIRECT SUGGESTION (Eighteen-line test)

Curve shows averages by grades from A3rd to A8th inclusive with a total of 421 cases, the number of lines increased by the children. Only six of these shown by experimenter increased.

Chart #2.

Name

Date

Forty-three line Test.

A similar test was tried with the B7th class of 26 boys, with the following changes: The number of lines shown were 43, and the boys were asked to decide how long they thought the lines were in inches and put down the number of inches which they decided ^{without drawing the lines} on their papers. Six of the lines increased in length, just as in the former experiment. It is interesting to note that the number of lines that were judged on the average to increase was seven. It will be recalled that in the eighteen line test the pupils were asked to "draw" lines "like" the ones that were shown to them. A comparison of the results of the two methods is shown in chart #3. The two classes compared are both in B7th grade. In the eighteen line test, with 32 cases, and when the lines were drawn 4.2 lines on the average beyond the sixth increases with a m.v. of 3.1. In the forty-three line test, with 26 cases, only one line on the average beyond the sixth

INDIRECT SUGGESTION

(Comparison of eighteen and forty-three line test)

Number of lines shown by the experimenter 18 or 43 lines increased in length	Cases	Lines drawn by pupils which continued to increase	M.V.	Lines beyond the length which pupils continued to increase
18	32	10.2	3.1	4.2
43	26	7.0	.92	1.0

DIRECT SUGGESTION.

Comparison of eighteen-line test where children drew lines "like" those shown them, and forty-three line test where children estimated length of lines and put down their estimation in inches.

Chart # 3.

was estimated to increase, with a m.v. of .92.

Comparison shows that the second method calls out too much the critical attitude, and very greatly lessens the effectiveness of the suggestion.

The eighteen-line test shows quite clearly the effect of age on suggestibility. The following shows ^{by grades} the average increase of the lines in millimeters: 3rd, 8.6mm, m.v. 3.33; 4th grade 8, m.v. 3.59; 5th grade 5.17, m.v. 5; 6th grade 6, m.v. 4.14; 7th grade 4.22, m.v. 6.1; 8th grade 2.88, m.v. 7. The results are plotted on chart #2. The curve is quite regular and clearly shows that the indirect suggestion was more effective on the younger children. Averaging the results of all these classes together, it is found that the increase due to suggestion was 5.4 mm, with a m.v. of 4.55.

INDIRECT SUGGESTION

MEMORY TESTS.

The suggestion test for memory was based on the memory test that immediately preceded it. Twelve objects were given for a memory test, as follows: Picture of Weber, taken from the philosophical series of portraits, an ordinary drawing pencil, sharpened and without ^{an} eraser, watch-chain, bone-handled pocket knife with two blades both of which were closed, book, which was Seashore's *Experiments in Experimental Psychology*, red baby ribbon, table spoon, white button glued to cardboard, a piece of hemp cord, silver dollar, pocket mirror, and an envelope which was addressed but which had no stamp. Taking three of the questions to illustrate the three degrees of suggestion, e.g., for slight suggestion: "was there a stamp on the letter?" ^{*this suggests without directly implying the presence of the thing mentioned*} The questions for moderate suggestion ^{*directly*} implied the presence of the thing suggested, e. g.: "what was on the front cover of the book?" While for

strong suggestion, the questions were put so as to have room for only one of two answers, that is, it was suggested that only one of two possible alternative answers could be correct, and the problem was to choose the correct alternative. For instance, "which kind of glasses did the man in the picture wear, the kind that go over the ears, or just the nose glasses?"

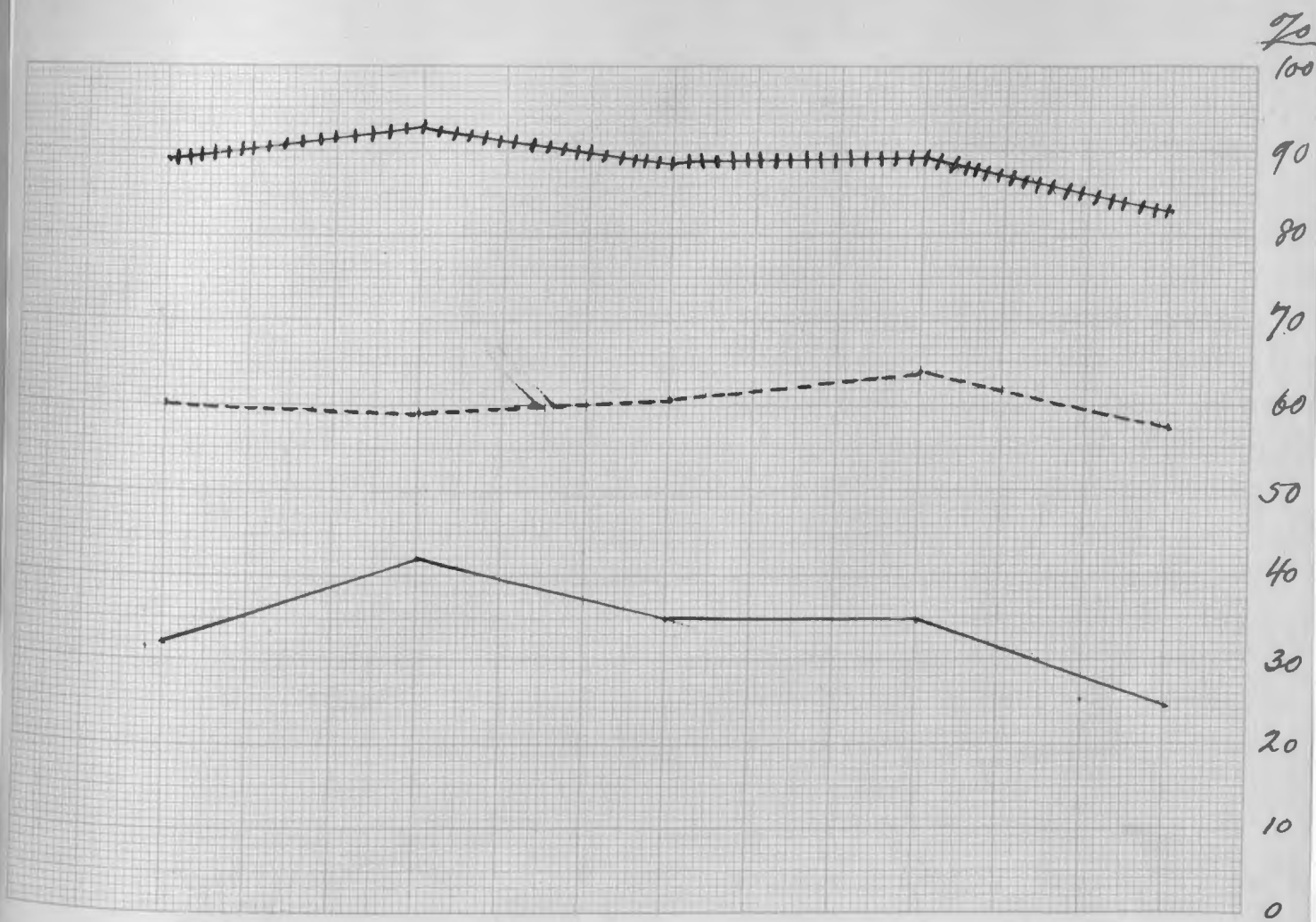
As has been said, none of the things suggested to the pupils by these questions were really present. The results are as follows, the figures showing the per cent of pupils who accepted the suggestion:

Grades	Degree of suggestion used			Cases
	Weak	Medium	Strong	
4th	32.3%	60%	89%	69
5th	42.4%	59%	93.2%	84
6th	35.6%	60.7%	88.6%	85
7th	34.2%	64%	89.2%	84
8th	24.6%	57%	83%	69

Averaging the results together, the slight suggestion was effective in 33.8% of the cases; the moderate suggestion in 60.5%, and the strong in 88.6% of the cases. See charts #4 and #5. It is interesting to note that including the A3rd grade with the above, which makes a total of 421 cases, only 10 out of this whole number gave a negative answer to the ninth question in regard to the glasses; i.e. would have answered the question right and said that he wore no glasses. In other words, 92% said that he wore one of the two kinds of glasses. *Twenty-eight pupils did not answer the question at all.*

The questions in each of the three groups also vary considerably in their degree of effectiveness.

Chart #6 shows the per cent of pupils in the five upper grades, 4th through the 8th, accepting the suggestion in each of the nine questions. These three groups of questions show, when their results are averaged, that the questions used were of three well defined degrees of suggestion, and that the second group is about the same



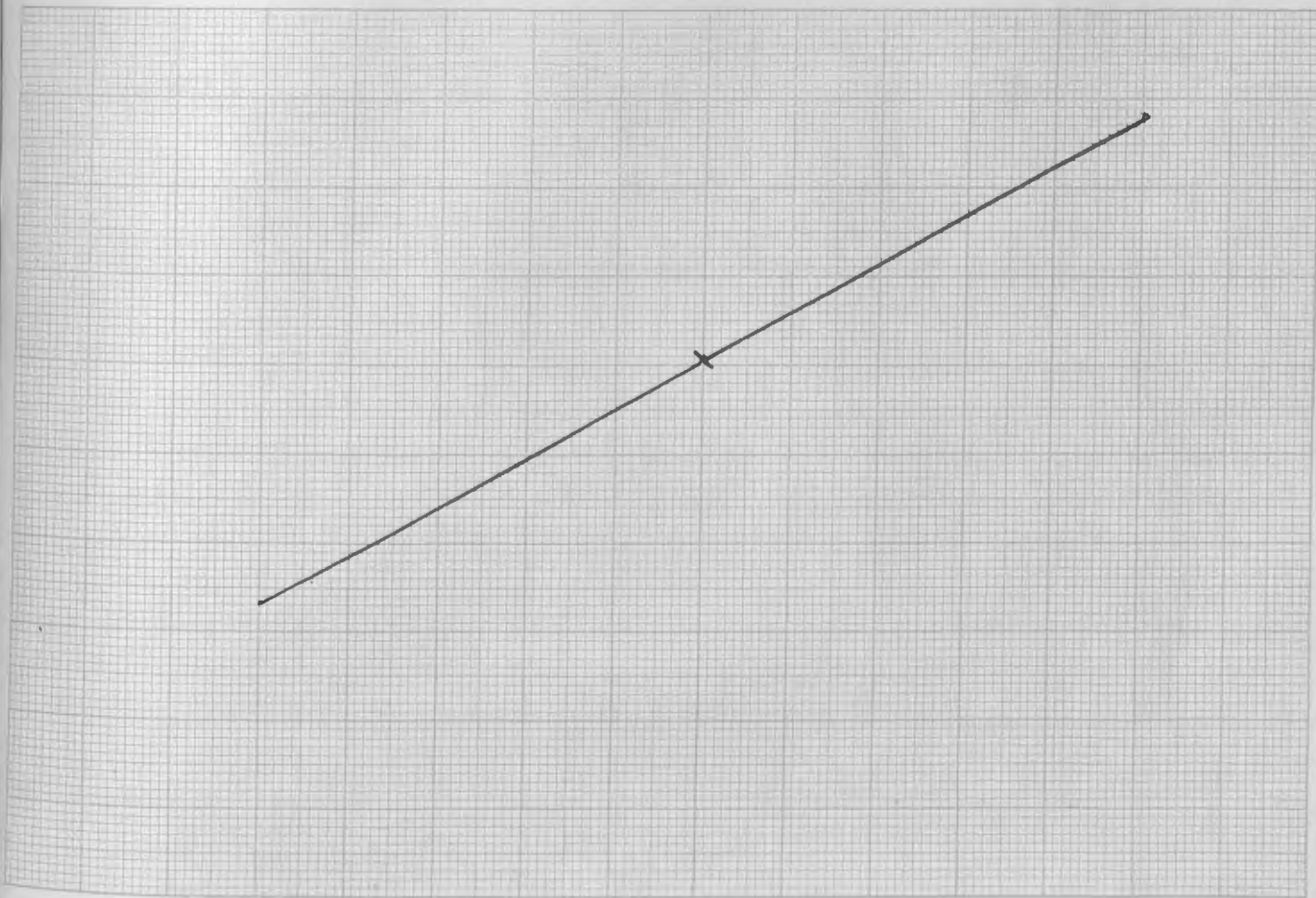
Grades: 4th 5th 6th 7th 8th

INDIRECT SUGGESTION (Macy Test)

Curves showing the percent of pupils accepting the weak, medium, and strong suggestion respectively. The effect of weak suggestion is shown by the full line; moderate suggestion by the dotted line; and strong suggestion by the crosses.

Chart #4.

Name
Date



Slight Suggestion

Moderate Suggestion

Strong Suggestion

INDIRECT SUGGESTION (Memory Test)

Curve showing the average results of the three groups of suggestive questions in the memory test. There were three questions in each group. The results plotted are for 381 cases in the 4th through the 8th grade inclusive.

Chart # 5.

Name

Date

Grades	Number of Question	% accepting slight Suggestion	Number of Question	% accepting Moderate Suggestion	Number of Question	% accepting strong Suggestion	Cases
4	1	30.	4	65.	7	95.3	69
	2	20.1	5	62.	8	82.6	
	3	46.5	6	58.	9	95.6	
5	1	42.9	4	58.3	7	96.4	84
	2	56.	5	64.3	8	83.	
	3	57.	6	53.6	9	95.2	
6	1	43.5	4	71.8	7	95.4	85
	2	20.	5	51.7	8	83.5	
	3	43.5	6	58.8	9	87.	
7	1	46.	4	82.5	7	96.	74
	2	24.3	5	52.6	8	78.4	
	3	32.4	6	56.8	9	93.2	
8	1	37.7	4	66.6	7	90.	69
	2	4.4	5	50.7	8	63.8	
	3	31.8	6	53.6	9	95.7	

INDIRECT SUGGESTION (Memory Test)

Chart showing the effect of each of the nine questions by grades. The figures represent the percent of pupils in each grade who accepted the suggestions. The results are for 381 pupils through the 4th to 8th grades inclusive.

Chart #6.

distance above the first group as the third is above the second. The results show nearly a straight line. See chart #5.

INDIRECT SUGGESTION

Odor test with and without imitation.

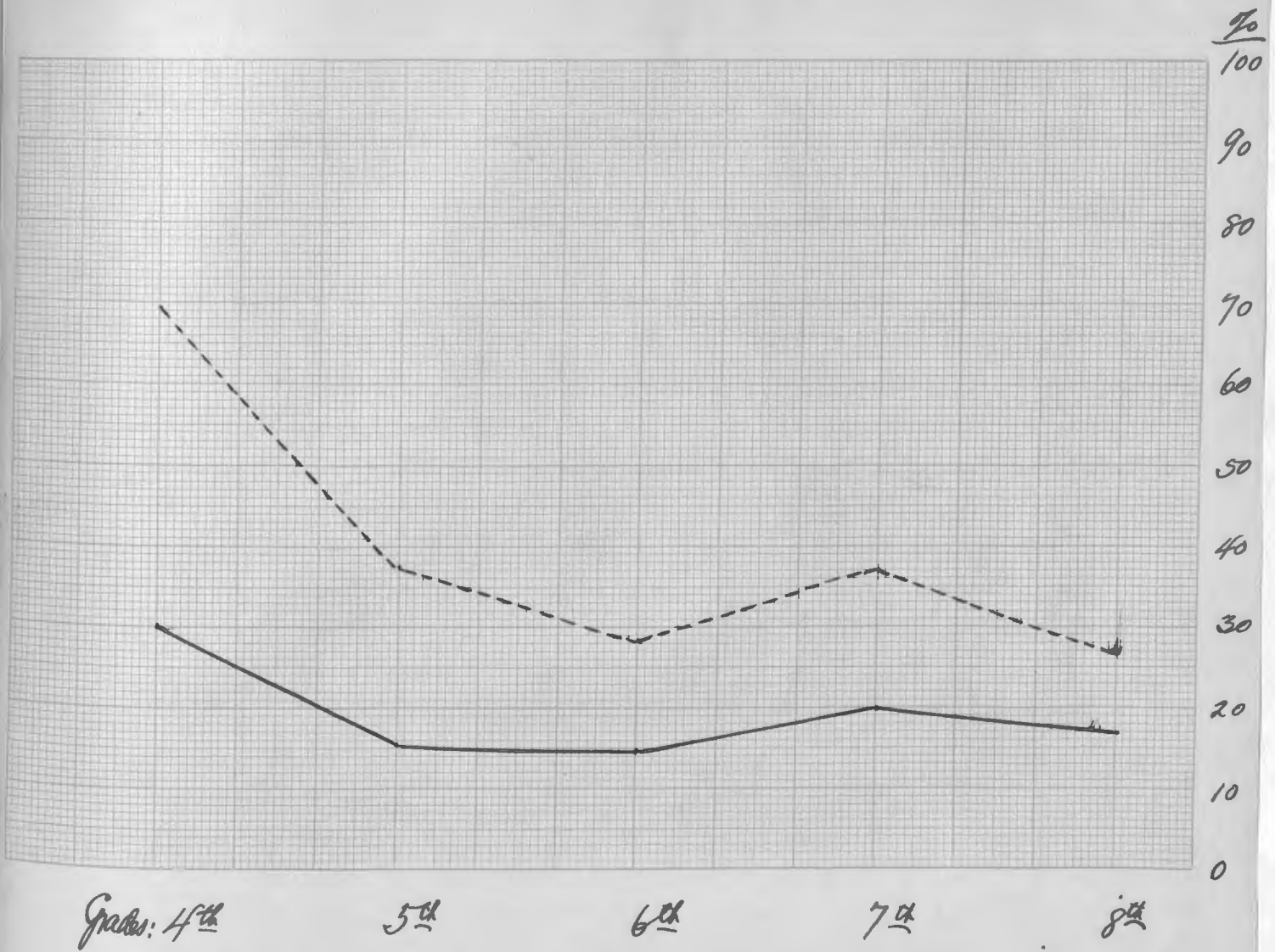
The following are the results for the odor test:

Grade	Without imitation	With imitation	Cases
4th	30.4%	69.65%	69
5th	16.5%	37.7%	84
6th	15.25%	18.15%	85
7th	20.8%	37.95%	84
8th	16.92%	27.5%	69

The first column shows the results where the children were asked to give their answers without any communication with one another. The second shows the results of the same test but given with the request that the children raise their hands as soon as they smell the odor. It should be noticed that the suggestion from

the remarks made by the experimenter was very slight, and for the first part of the test could hardly have been less. The results are plotted on chart #7.

Elsson gave strong suggestion, even saying that he hoped the odor would not be too disagreeable, and when he poured it out on some cotton turned away as though it was very strong. His suggestion, much stronger than the above, is reported to have been effective in about 75% of the cases. *His experiment was with adults.*



Grades: 4th
381 cases

INDIRECT SUGGESTION (Odor Test)

The figures show the percent of children on the average in each grade from the 4th through the 8th inclusive, who accepted the suggestion of the odor. The full line shows the result of the first odor test; the broken line, the result where there was imitation of the crowd. Average without imitation was 19.94%; with imitation was 38.19%.

Chart #7

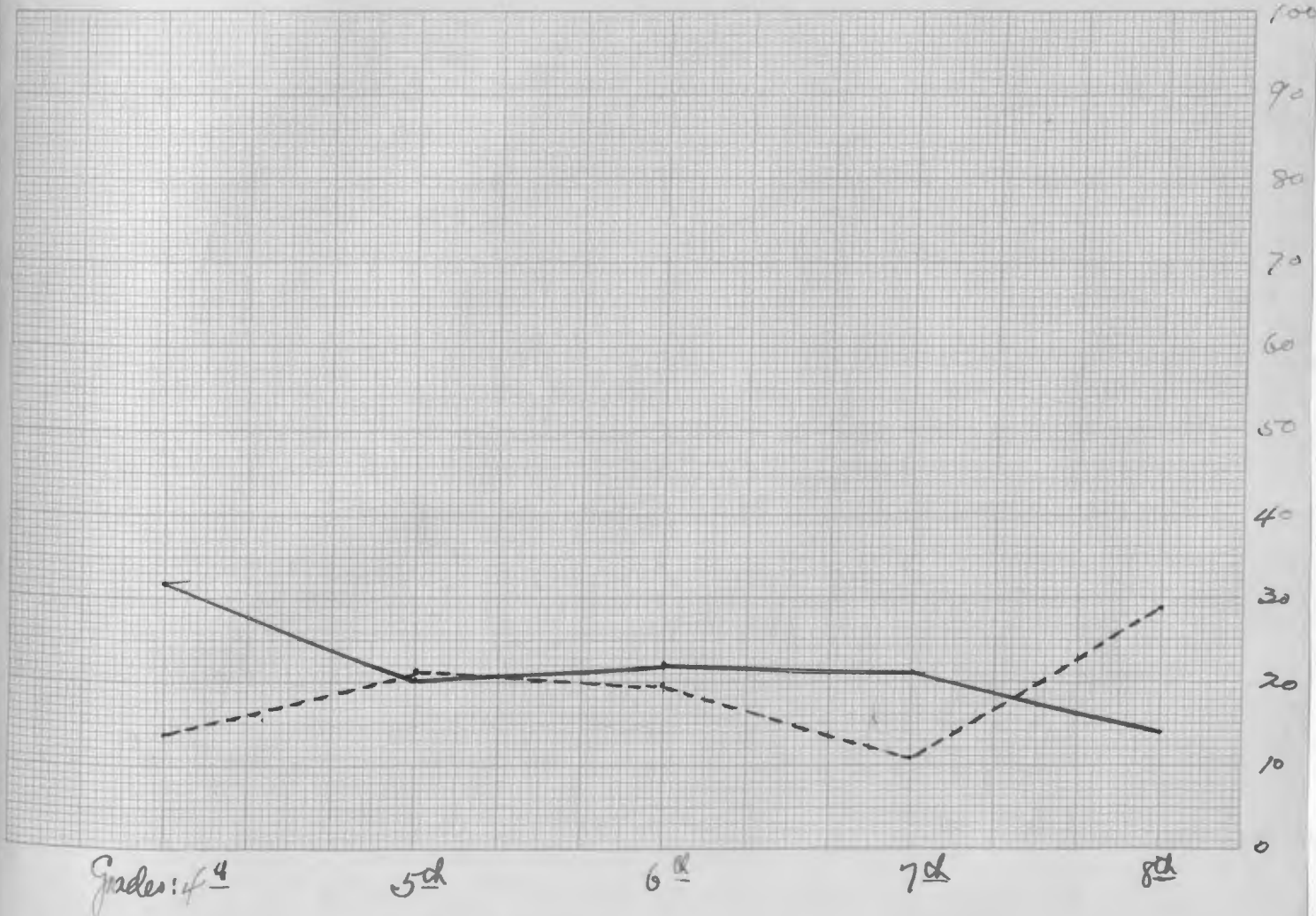
Name

Date

INDIRECT TEST

CIRCLE WITH NUMBER ENCLOSED.

Notwithstanding the fact that a visual illusion probably lessened the effectiveness of the number test, the results show that a larger number enclosed in a circle does affect the judgment of the size of the circle. In the 8th grade only were there more who thought that the circle with the 5 enclosed was larger than the circle containing 98. The test was intended to give a weak rather than a strong suggestion. This was further accomplished by allowing a third possible answer, that is, that the two circles were of the same size. The results are plotted on chart #8. They show that in the five grades, 4th to the 8th inclusive, the following per cent of pupils said that the circle with the larger number was the larger, viz: 32%, 21.25%, 22.7%, 20.95%, 14.65%. Those saying that the circle with the smaller number was larger were from the 4th to the 8th grades respectively: 14.35%, 20.75%, 20.15%, 11.5%, 29%.



INDIRECT SUGGESTION (Circle with inclosing number)

The full line shows the percent of pupils saying that the circle containing the figure 98 was the larger; the broken line shows the percent of children saying that the circle inclosing the figure 5 was the larger. Results are for the 4th through the 8th grade, with a total of 381 cases.

Chart #8.

Name

Date

INDIRECT SUGGESTION

IMITATION OF THE EXPERIMENTER.

The inverted carats which was used under the figures that were put on the board to number the tests as they came in order, was an effective suggestion to all but 51 pupils out of 421 cases. In other words, 88% used this sign from one to thirteen times in numbering their tests, and some used them to number the parts of the tests besides. Of the 10 or 12 adults to whom these tests were given none used the symbol even once.

CORRELATIONS.

CORRELATIONS.

Correlations between direct and indirect suggestion as shown by the line tests.

The Relation of direct to indirect suggestion is an open question. Some light thrown upon the subject by the results of the line tests. A modification of Thorndike's method of median ratio, as suggested by Prof. Miner was used. And according to this method the relation as expressed by the median ratio is only .05. There were 144 cases studied, with an average in the direct suggestion test of 9mm. and a m. v. of 1.8; while in the indirect test the average was 18mm. with a m. v. of 9.

According to these results a person who is suggestible even to a marked degree in one of these kinds of suggestion would be no more likely to be suggestible in the other kind.

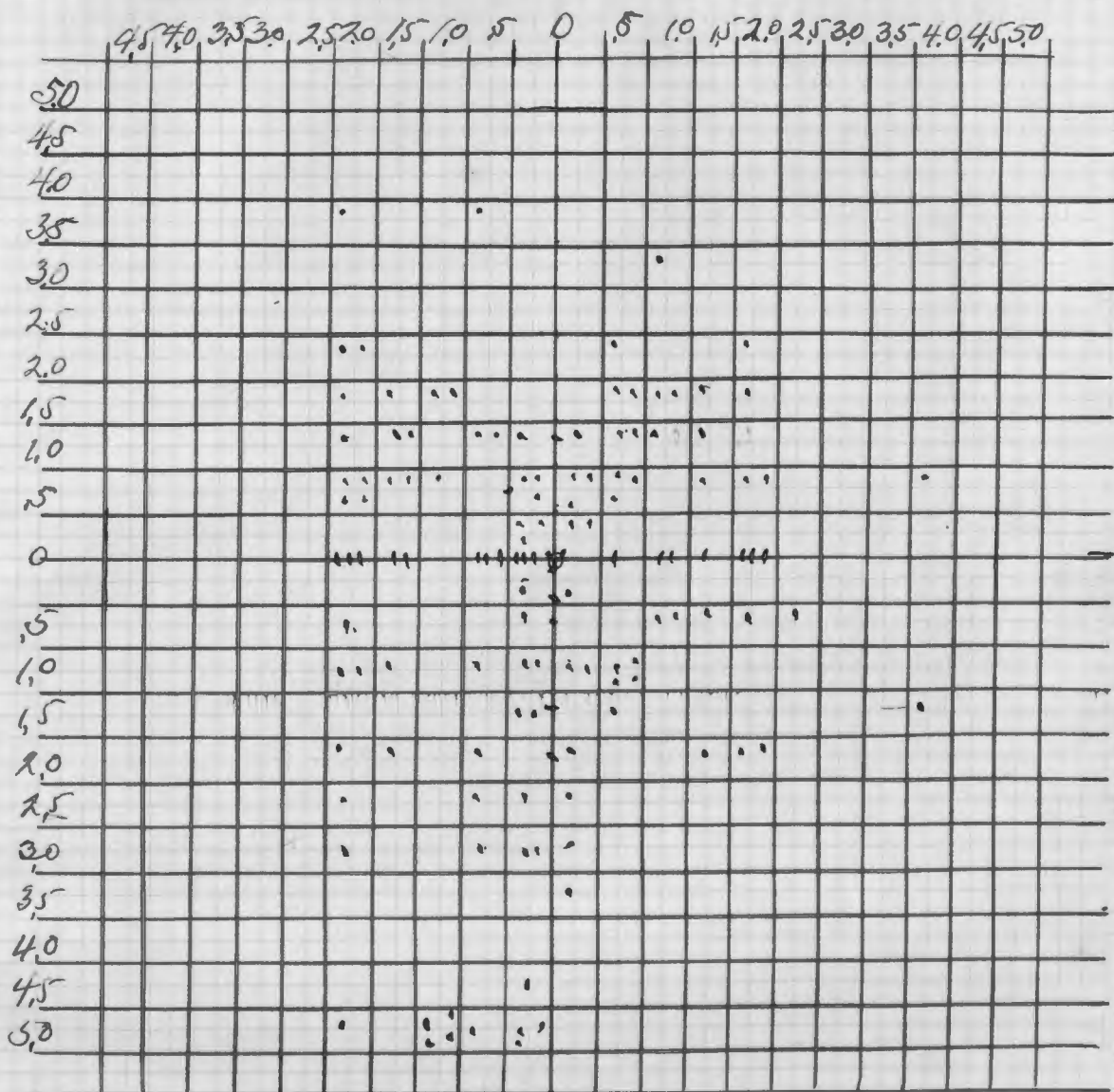
Chart #9 shows the distribution of cases. The individual record for any case on this chart is made by dividing the individual deviation by the mean deviation.

Correlation between direct suggestion as shown by the three-line test and scholarship as shown by the teacher's lists.

The method chosen was that of dividing the cases into quartiles as shown in chart #10. This was accomplished by taking the 25% in each class that showed the greatest amount of suggestibility and distributing these in quartiles according to scholarship. Then taking the 25% that showed the next greatest amount of suggestibility and distribution in the same way as to scholarship, etc. 400 cases were studied.

The result shows that a negative relation probably exists, and a tendency to antagonism. Those who are best in scholarship tend to be least affected by direct suggestion, while the lowest in scholarship seem to have been affected more by the direct suggestion.

**CORRELATION OF DIRECT SUGGESTION (Three-line test)
and INDIRECT SUGGESTION (Eighteen-line test).**



X shows distribution for direct suggestion. Y for indirect suggestion. The negative ratio contains 68 cases. By taking half of the zero cases, the median ratio falls between the 72nd and 73rd cases. Median ratio is found to be .05

Chart # 9.

Correlation of Scholarship (teacher's list) and direct suggestion (three-line test). Results for the 4th through the 8th grades inclusive, with a total of 400 cases.

← Three-line test

Scholarship →

	1st quartile	2nd quartile	3rd quartile	4th quartile
1st quartile	16%	29%	25%	30%
2nd ..	22%	25%	26%	27%
3rd ..	38%	17%	25%	20%
4th ..	24%	31%	27%	18%

Of the best 25% in scholarship,
16% are in the 1st quartile of suggestibility
30% are in the 4th "

Of the lowest 4th in scholarship,
24% are in the 1st quartile in suggestibility
18% are in the 4th " "

Of the 1st quartile in scholarship half as many are in the 1st quartile as are in the 4th in suggestibility.

Of the 4th quartile in scholarship 25% more are in 1st quartile than are in the 4th in suggestibility.

METHODS OF CORRELATION.

Correlation as shown by quartiles is simple and quick, and for rough work is useful to show general tendencies. It, of course, has not the advantages of the Pearson coefficient, or median ratio, in showing the amount of correlation in one figure.

The first method used above, which is a modification of Thorndike's method of median ratio, as suggested by prof. Miner, has the advantage of graphically presenting the relationships after the difference in variability of the two traits is allowed for. This modification consists in dividing the individual deviation by the mean deviation, and gives the equivalent in variation at once. The correlation may be stated in one figure and the distribution of cases is indicated. It is more complete than the Pearson coefficient, or Ruediger's method of percentage of displacement, since it shows all the ratios. It has another advantage over the Pearson Coefficient in that it is not affected by extreme cases. The Pearson

coefficient loses much of its meaning if the distributions are not according to the normal probability curve, while the graphic table of ratios can be read directly for any position of the group. See Thorndike's "Empirical Studies in the Theory of Measurement."

CONCLUSIONS.

Criticisms of Tests.

The line tests after Binet seem to be as good as any that have been proposed. They allow of wide distribution and do not call out a critical attitude. The indirect test should have more than 18 lines, as many continue to increase the lines through the entire 18. The effects of fatigue or monotony is an objection to too long a test, as the last lines would be drawn carelessly and with a considerably different degree of interest and attention. Having the pupils draw the lines on their papers is a much better way than having them calculate the length in inches and then write down the number of inches, as the latter method calls the attention too closely to judging and thereby counteracting the affect of the suggestion.

The suggestion test for memory shows three distinct types of suggestive questions. They were worked

out of the following plan: Questions of slight suggestion was to suggest without implying the presence of the thing suggested. The questions of moderate suggestion were to go farther and to imply that something was actually present when it was not. The questions calculated to give the strong suggestion implied that only one of the two alternatives suggested could be the correct answer. The questions used seem to bring as good results as might be expected.

The odor tests as given in this investigation and as given by Slosson are both valuable and bring out the difference in the results of the same test as given with strong and with weak suggestion, and as given with and without imitation.

The test with circle and number is useful for a method of quick discrimination of the suggestible pupils in a class. The numbers should both be of the same number of digits so as to avoid introducing a visual illusion which would materially alter the results of the suggestion. The methods of correlation have already been discussed.

CONCLUSIONS.

Summary of results.

The line tests seem to show as far as they go that there is no correlation between direct and indirect suggestion. A person who is found to be very suggestible according to a direct suggestion test is no more likely to be suggestible to an indirect suggestion test, and vice versa. This means that so far as these tests can show that people who are affected by one kind of suggestion may not be at all responsive to the other kind of suggestion. It is altogether too broad a statement to say that a person is susceptible to suggestion. The question is left, suggestible to what kind of suggestion?

It appears from the second study of relationships that there is no correlation between direct suggestibility and scholarship. The three-line test and scholarship list show on the contrary a tendency to antagonism. In other words those who are best in scholarship appear

to be less affected by direct suggestion. This does not agree with Binet's conclusion that suggestibility is synonymous with educability. It may be found, however, that educability and susceptibility to indirect suggestion bear some such relationship.

Suggestive questions may be asked in regard to objects shown within a very few moments previously and accepted to an astonishing degree, which shows the utter unreliability of children's testimony, when asked suggestive questions.

Suggestive questions may be divided into three very definite groups on the following plan: Weak suggestion given by simply suggesting something but with slight implication as to whether or not it was really there; moderate suggestion by a question definitely implying the actual presence of the thing suggested; and strong suggestion by one which implies that only one of two false alternatives can be the truth of the matter.

A series of questions might be worked out on the basis of the amount of absurdity in each question, on the theory that only the most suggestible would accept the more absurd suggestions; this would be a study of the effect of suggestion on judgment.

Both direct and indirect suggestion appear to be more effective on the younger children. This was shown in both the lone tests and in the odor test as given with imitation.

The number and circle test shows that a large number inclosed in a circle affects the judgment of the size of the circle.

Imitation of the odd symbol used is likely the result of the habit of imitating the teacher. The lack of imitation in adults may be on account of their having specialized habits which would counteract the results of suggestion.

BIBLIOGRAPHY

Note: This bibliography includes only studies in normal suggestibility; references to the related topics, such as suggestive therapeutics, psychology of testimony, illusions, etc., are intentionally omitted.

1. Baldwin, J. M., Suggestion in Infancy, *Science* 17: 113.
" " Mental Development, 1906, pp 104.
" " Handbook of Psychology
2. Bagley, W. C.;
3. Bell, J. Carleton, The Effect of Suggestion upon the Reproduction of Triangles and Point distances, *Am. Jour. Psych.* 19: 504-18. Reviewed in *Psych. Bull.* 6, 1909, pp 319.
4. Binet, Alfred, *La Suggestibilité*, 1900, gives results of an extensive study with tests for direct and indirect suggestibility, and for different degrees of suggestibility.
5. Binet, A., *L'Année Psych. Le Développement de*

- L'Intelligence, 5, 1899, pp 82.
6. Brand, J. E., Verbal Effect of Suggestion on the estimation of Linear Magnitudes, Psych. Rev. 12, 1905, pp 41.
 7. Carus, P., Suggestion and Suggestibility, Open Court, 3: 2032.
 8. Carichoff, E. R., Suggestion as a Means of Punishment in School. Academy (Syr) 3:559.
 9. Clarke, William A., Suggestion in Education, 1900.
 10. Delabarre, E.B., Influence of Surrounding Objects upon the Apparent Direction of a Line, Stud. in Philos. and Psych. 1906, pp 239-96.
 11. Forel, Auguste, Suggestion Die Sexuelle Frage, MiniaE.
 12. Quidi, M. Guido, Sur La Suggestibilite, Travail de Lab., de Psych U. of Rome.
 13. Keatings, Maurice Walker, Suggestion in Education.
 14. Krebs, Stanley L., The Law of Suggestion, a compendium for the people.

15. Lippman, Otto, Die Wirkung der Suggest in fragen, Zeits. f. angewandte Psych. 1, 2, 1907, 1908. Reviewed in L'Annee Psych. 14, 1908, pp 467. This is a study of tests given for the measurement of different degrees of suggestibility.

17. Marshall, H. R., Subattentive Consciousness and Suggestion, Jour. of Philos., Psy. 1909, 5: 477-82.

18. Munsterberg, H., Psychology and the Teacher, 1909, pp 172, 317. Suggests tests that may be given in the school room.

19. Newbold, W. R., Suggestibility, Automism and Kindred Phenomena, Pop. Sci. M., 48: 193, 375, 520, 641.

20. Pearce, H. J., Normal motor Suggestibility (Contrib. from Psy. Lab. of U. of Ohio) Psy. Rev. 9, 1902, 329-336.

21. Pierce, G. J., Formative Influences, Pop. Sci. M/Je '097, 4: 579.

22. Pillsbury, Jour. of Psyc. Vol. 8: 315.

23. Ross, Edward A., Social Psychology, 1908, Ch.2.
24. " " Social Control by Suggestion, Am. J. Social, 2:255.
25. Saleeby, C. W., Scientific Aspects of Suggestion, Acad. 65: 337.
26. Schenkunz's Psychology der Suggestion.
27. Sidis, Boris, Psychology of Suggestion. One of the most extended studies that has been made in suggestion. Evidence for suggestibility are given, the state of suggestibility analyzed, and laws of suggestion formulated.
28. Simon, Suggested Involuntary Movements.
29. Slossen A Lecture Experiment in Hallucinations, Psych. Rev. 1909, 6, pp 407.
30. Small, M H., Suggestibility of Children, Pedag. Sem., 1896, 4:176. This is a good study of suggested illusions. It gives the results of a series of tests given in the school room.

31. (Smith, W. G. and see Sowton
(
(Sowton, S.C.H., Observations on Spatial Con-
trast and Confluence, in visual Perception, Brit. Jour.
Psych. 1907, 2: 196-219.

32. Tawney, Philos. Studien, Vol. 13, p 163.

33. Thorndike, E. L., Empirical Studies in the
Theory of Measurement, Columbia University contribution
to Philos. and Psych. XV #3.

34. Walostein, Louis, The Subconscious Self and
its Relations to Education and Health.